

## CLAIMS

1 1. A multimode electrochemical sensing array comprising a semiconductor chip  
2 having formed thereon:

3 A. an Ion Selective Field Effect Transistor, said transistor having an exposed  
4 Gate for contact with a test solution when immersed therein, said Gate being surrounded  
5 by, but spaced from, a conductive surface that serves as both an electrode and a light  
6 shield for the transistor;

7 B. a plurality of electrodes spaced remotely from said transistor, at least one of  
8 said electrodes being connectable in circuit with said conductive surface and with an ex-  
9 ternal current source to provide a current for electrochemical determination of a pa-  
10 rameter of said solution.

1 2. A multimode electrochemical sensing array according to claim 1 in which said  
2 current source is polarized to provide a titrant in the vicinity of said Gate.

1 3. A multimode electrochemical sensing array according to claim 1 in which said  
2 current source is polarized to provide a titrant in the vicinity of said at least one remotely  
3 spaced electrode.

1 4. A multimode electrochemical sensing array according to claim 1 in which said  
2 remotely spaced electrodes includes comprise a first pair of electrodes, each of a first  
3 area, and a second pair of electrodes, each of a smaller area than said first area, said  
4 electrodes being connectable in circuit with an external current source and an external  
5 voltage meter to provide conductivity measurements of a test solution in which they are  
6 immersed.

1 5. A multimode electrochemical sensing array according to claim 1 in which said  
2 remotely spaced electrodes include at least one electrode for performing oxida-  
3 tion/reduction measurements with respect to an external reference electrode.

1 6. A multimode electrochemical sensing array according to claim 1 in which said  
2 remotely spaced electrodes include at least one electrode connectable through a potential  
3 regulating element to said conductive surface for limiting the potential on said surface.

1 7. A multimode electrochemical sensing array according to claim 6 in which said  
2 potential regulating element comprises a varistor.

1 8. A multimode electrochemical sensing array according to claim 1 in which said  
2 remotely spaced electrodes include at least one electrode connectable to ground to  
3 thereby connect a test solution to ground potential when desired.

1 9. A multimode electrochemical sensing array according to claim 1 in which said at least  
2 one electrode is connectable in circuit with an external source of constant current.

1 10. A multimode electrochemical sensing array according to claim 1 in which said at  
2 least one electrode is connectable in circuit with an external source of current that in-  
3 creases during its application.

1 11. A multimode electrochemical sensing array according to claim 1 in which said at  
2 least one electrode is connectable in circuit with an external source of current that in-  
3 creases linearly during its application over at least some range thereof.